

# **BRIEF NUMERICAL KEYPAD AND ITS OUTPUT METHOD**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention:**

The present invention relates to a keypad and, more  
5 specifically, to a brief numerical keypad, which simplifies the  
number of keys and their arrangement.

### **2. Description of the Related Art:**

Figure 1 shows the arrangement of a conventional  
numerical keypad. As illustrated, the numerical keypad comprises  
10 10 keys ranged from "0"~"9". The keys "1"~"9" are arranged in the  
form of a 3x3 matrix, and the key "0" is independently disposed  
near the matrix. Each key has a top operation face printed with a  
numeral or a sign expressing a specific number, a bottom mounting  
face provided with signal transmission means corresponding to a  
15 respective contact at a keypad matrix circuit. When pressed one key,  
the corresponding contact is electrically connected, thereby  
causing the keypad matrix circuit to output a corresponding scan  
signal.

In order to let the operator accurately press every key  
20 without triggering neighbor keys, the keys are orthopedically  
engineered to have an about 12mmx12mm operation face, and  
spaced from one another at a pitch not less than 5mm. However, the  
size of a numerical keypad must be reduced when used in a compact,

small-sized electronic apparatus. When a numerical keypad made in a mini form, the operator may click a wrong key or erroneously click two keys at the same time. Further, if the operator suffers an eyesight problem, he (she) may be unable to identify the keys of a  
5 mini numerical keypad.

## **SUMMARY OF THE INVENTION**

The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a brief numerical keypad, which reduces the number of  
10 keys and increases the area of the operation face of each key without affecting the decimal operation.

To achieve this and other objects of the present invention, the brief numerical keypad comprises four number keys aligned in X-axis and Y-axis directions and abutted against one another, each  
15 expressing one of the numbers from 1~9; a plurality of double-bridging operation portions respectively bridging the abutted area of two adjacent number keys, each double-bridging operation portion expressing a number equal to the sum of the numerals of the respective two abutted number keys; and a plurality  
20 of triple-bridging operation portions respectively bridging the abutted area of three adjacent number keys, each triple-bridging operation portion expressing a number equal to the sum of the numerals of the respective three abutted number keys.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a top plain view of a numerical keypad according to the prior art.

FIG. 2 is a schematic plain view showing the arrangement  
5 of keys of a brief numerical keypad according to the present invention.

FIG. 3 is a top plain view of a brief numerical keypad according to the first embodiment of the present invention.

FIG. 4 is a top plain view of a brief numerical keypad  
10 according to the second embodiment of the present invention.

FIG. 5 is a top plain view of a brief numerical keypad according to the third embodiment of the present invention.

## **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIG. 2, a brief numerical keypad in accordance  
15 with the present invention comprises:

a plurality of number keys aligned in X-axis and Y-axis directions and abutted against one another, each expressing one of the numbers from 1~9;

a plurality of double-bridging operation portions  
20 respectively bridging the abutted area of each two adjacent number keys; and

a plurality of triple-bridging operation portions respectively bridging the abutted area of each three adjacent

number keys.

The aforesaid brief numerical keypad employs a specific output method as outlined hereinafter:

When pressed one number key, the brief numerical keypad  
5 outputs a signal expressing one of the numerals 1~9.

When pressed one double-bridging operation portion, the brief numerical keypad outputs a signal indicative of the sum of the numerals of the pressed two number keys, which sum is not equal to either of the number keys been pressed.

10 When pressed one triple-bridging operation portion, the brief numerical keypad outputs a signal indicative of the sum of the numerals of the pressed three number keys, which sum is not equal to the numeral expressed by either of the number keys been pressed or the sum of the numerals of either two of the three number keys  
15 been pressed.

The arrangement of the aforesaid brief numerical keypad and its output method are preferably expressed by the following example, which comprises:

four number keys (a)(b)(c)(d) arranged in X-axis and  
20 Y-axis directions and abutted against one another, each expressing one of the numbers from 1~9 (see FIGS. 3~5);

five double-bridging operation portions (b-c)(a-b)(a-c)(b-d) (c-d) respectively bridging the abutted area of each two of the four

number keys (see the imaginary rectangular frames in FIG. 2); and  
two triple-bridging operation portions (a-b-c)(b-c-d)  
respectively bridging the abutted area of three adjacent number  
keys (see the imaginary triangular frames in FIG. 2).

5           FIG. 3 shows a first embodiment of the brief numerical  
keypad according to the present invention. According to this  
embodiment, the four number keys are arranged in the order of  
top-bottom-left-right, respectively expressing the numerals "4",  
"7", "1", "2". When pressed one number key, the brief numerical  
10 keypad outputs a signal expressing the corresponding numeral. For  
example, when pressed the number key printed with the numeral  
"7", the brief numerical keypad outputs a signal indicative of the  
value "7". When pressed one of the double-bridging operation  
portions (b-c)(a-b)(a-c)(b-d)(c-d), the brief numerical keypad  
15 outputs a signal indicative of the sum of the values of the two  
number keys been pressed. For example, when pressed the  
double-bridging operation portion (b-c), the brief numerical keypad  
outputs a signal indicative of the sum  $1+2=3$ ; when pressed the  
double-bridging operation portion (a-b), the brief numerical keypad  
20 outputs a signal indicative of the sum  $4+1=5$ ; when pressed the  
double-bridging operation portion (a-c), the brief numerical keypad  
outputs a signal indicative of the sum  $4+2=6$ ; when pressed the  
double-bridging operation portion (b-d), the brief numerical

keypad outputs a signal indicative of the sum  $1+7=8$ ; when pressed the double-bridging operation portion (c-d), the brief numerical keypad outputs a signal indicative of the sum  $2+7=9$ ; when pressed the triple-bridging operation area (a-b-c), the brief numerical keypad outputs a signal indicative of the sum  $4+1+2=7$ ; when pressed the triple-bridging operation portion (b-c-d), the brief numerical keypad outputs a signal indicative of the value of the ones place of the sum  $1+2+7=10$ . Therefore, the four number keys are sufficient to output numerals 0~9 of the decimal system.

FIGS. 4 and 5 show second and third embodiments of the brief numerical keypad. According to the second embodiment, the four number keys are arranged in the order of top-bottom-left-right respectively expressing the numerals “3”, “7”, “1”, “2”. According to the third embodiment, the four number keys are arranged in the order of top-bottom-left-right respectively expressing the numerals “4”, “8”, “1”, “2”.

According to the conventional numerical keypad design, there are ten number keys respectively expressing the numerals 0~9 of the decimal system. According to the present invention, four numeral keys are sufficient to complete the output of the numerals 0~9 of the decimal system. Therefore, the invention enables the operation face of each number key to be relatively increased without changing the total area of the brief numerical keypad.

A prototype of brief numerical keypad has been constructed with the features of FIGS. 2~5. The brief numerical keypad functions smoothly to provide all of the features discussed earlier.

Although particular embodiments of the invention have  
5 been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.